

## THE CULTURE OF Penaeus japonicus IN JAPAN<sup>1</sup>

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### ABSTRACT

The Japanese are recognized as having played a major role in the development of aquaculture. They have developed techniques for culturing several marine and freshwater species. Their methods for commercially culturing the shrimp Penaeus japonicus ("Kuruma-Ebi") are of particular importance because of the growing interest by the United States, in shrimp culture, stimulated by the present consumer demand for shrimp.

Spawning stock of P. japonicus may be acquired by two methods. First, they may be collected at the fishery wharves where they are landed alive by Japanese fishermen. Second, techniques have been developed to mature sexually, mate, and spawn these shrimp in captivity. The latter method, however, has not been incorporated into the commercial operation because the expense and time required make the process uneconomical.

Once collected, gravid females are spawned in rearing tanks of various sizes. The most popular tank in use is made of cement which has a capacity of about 200 m<sup>3</sup>. Its dimensions are 10 m x 10 m x 2 m. The number of spawners required per tank is determined primarily by the season of the year. In early spring only about 5% of the 100 to 200 gravid females placed in each tank will successfully spawn whereas in autumn about 50% of the 25 to 50 used will spawn successfully. Despite this seasonal variation, about 50% of the eggs spawned will hatch.

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During larval culture, water temperature is maintained near 28 C by circulating live steam through pipes submerged in the rearing tank. Experience has demonstrated that the use of steam is more economical and safer than the use of electric heaters. As soon as the eggs hatch, the water is fertilized so that a dense growth of phytoplankton will be present when the nauplii metamorphose to the protozoal (zoeal) stage. Unfortunately, adequate blooms do not always occur, or cannot be maintained. In such instances, soybean cake (SBC) is added. Preliminary results with SBC indicate that it serves as a fertilizer for phytoplankton and as a food for larval shrimp. A postlarval crop of about 1 million (20 to 25 days old, 15 to 20 mm long, and weighing 18 to 20 mg) can be expected from one 200 m<sup>3</sup> tank.

Postlarval shrimp are stocked in ponds at a density of 12 to 15 per m<sup>2</sup> in the winter and 20 to 25 per m<sup>2</sup> in the early summer. Market sized shrimp (20 to 25 g) can be harvested from ponds in 5 to 6 months with approximately 50% survival from the date of stocking. During the pond culturing operation on a typical commercial prawn farm, the Japanese feed primarily natural foods such as bivalve meat, euphausiids, mysids, and scrap fish. Because of the supply and demand, however, the costs of these foods are increasing. In 1969, an estimated 200 metric tons of shrimp were produced in about 100 ha of ponds. At the Tokyo Center Fish Market live shrimp sell for between \$7 and \$30 per kg although the average price is \$10 to \$11 per kg. Production costs are about \$7 per kg.

Two major problems confront the Japanese aquaculturists. First, diseases occurring during the culture process cannot be controlled, occasionally resulting in total mortality of the shrimp. Second, an acute shortage of labor exists in the field of fisheries and aquaculture. Although more young people are graduating from college than ever before, they are entering the fields of manufacturing. Consequently, the labor force required for fisheries and aquaculture is dependent upon the older age groups of men and women.

Editors note: As a panel member of the United States Japan Cooperative Program on Natural Resources Mr. Mock attended the first joint meeting held in Japan. Biologists from these two countries exchanged data and discussed the art of aquaculture. After the formal meeting, each American scientist had the opportunity of observing first-hand, a number of experimental and commercial aquaculture installations. This presentation is an illustrated discussion of Mr. Mock's observations on the culture of the shrimp, Penaeus japonicus, or "KURUMA-EBI."